

### **Claims**

What is claimed and desired to be secured by Letters Patent is as follows:

1. An apparatus for cutting a concrete slab, said apparatus comprising:
  - a) a cutting head including:
    - i) a cutting element;
    - ii) a drive pulley and an outboard pulley about which said cutting element is entrained, wherein said drive pulley and said outboard pulley are spaced apart a sufficient distance such that said cutting element spans the concrete slab; and
    - iii) a foot structure adapted to minimize damage to the concrete slab during cutting by exerting pressure on a surface of the concrete slab adjacent said cutting element during cutting; and
  - b) a drive motor adapted to drive said drive pulley and said cutting element.
2. The apparatus as set forth in Claim 1, wherein said cutting element is a closed loop of flexible abrasive cable.
3. The apparatus as set forth in Claim 3, wherein said flexible abrasive cable is diamond wire including a steel cable strung through a plurality of beads onto which is bonded synthetic diamond material.

4. The apparatus as set forth in Claim 1, wherein said foot structure includes a channel-shaped foot having two horizontally-extending flanges which, during cutting, exert pressure against the surface of the concrete slab adjacent said cutting element.
5. The apparatus as set forth in Claim 1, wherein said foot structure retracts in order to maintain pressure on the surface of the concrete slab as said cutting element cuts.
6. The apparatus as set forth in Claim 1, wherein said drive motor is a hydraulic motor.
7. The apparatus as set forth in Claim 1, further including a guard substantially enclosing at least an upper portion of said cutting element and adapted to prevent accidental contact therewith.
8. The apparatus as set forth in Claim 1, further including:
  - a) a drive pulley enclosure substantially enclosing said drive pulley and adapted to prevent accidental contact therewith; and
  - b) an outboard pulley enclosure substantially enclosing said outboard pulley and adapted to prevent accidental contact therewith.

9. The apparatus as set forth in Claim 1, further including an inboard handle adapted to facilitate lowering and raising said cutting head during cutting.
10. The apparatus as set forth in Claim 9, further including an outboard handle adapted to further facilitate lowering and raising said cutting head during cutting.
11. The apparatus as set forth in Claim 1, and further including a moveable carriage adapted to support said cutting head and allow for lowering and raising said cutting element during cutting, wherein said moveable carriage includes a plurality of rolling elements that allow for rolling said apparatus into position for cutting.
12. The apparatus as set forth in Claim 11, wherein said plurality of rolling elements of said moveable carriage include an inboard rolling element and an outboard rolling element located such that, when said apparatus is positioned for cutting, said inboard rolling element is located adjacent a first side of the concrete slab and said outboard rolling element is located adjacent a second side of the concrete slab, such that said apparatus straddles the concrete slab.

13. An apparatus for cutting a groove in a curing concrete slab with a downward motion, said apparatus comprising:
- a) a cutting head including:
    - i) a cutting element, wherein said cutting element is a closed loop of flexible abrasive cable;
    - ii) a drive pulley and an outboard pulley about which said cutting element is entrained, wherein said drive pulley and said outboard pulley are spaced apart a sufficient distance such that said cutting element spans the curing concrete slab;
  - b) a drive motor adapted to drive said drive pulley and, in so doing, drive said cutting element; and
  - c) a moveable carriage adapted to movably support said cutting head over the curing concrete slab, said moveable carriage including an inboard rolling element and an outboard rolling element that allow for rolling movement of said apparatus.
14. The apparatus as set forth in Claim 13, wherein said flexible abrasive cable is diamond wire including a steel cable strung through beads onto which has been bonded synthetic diamond material.

15. The apparatus as set forth in Claim 13, wherein said drive motor is a hydraulic motor.
16. The apparatus as set forth in Claim 13, wherein said inboard and outboard rolling elements are located such that, when said apparatus is positioned for cutting, said inboard rolling element is located adjacent a near side of the curing concrete slab and said outboard rolling element is located adjacent an opposite, far side of the curing concrete slab, such that the entirety of said apparatus straddles the curing concrete slab.
17. The apparatus as set forth in Claim 13, wherein said moveable carriage is adapted to allow for lowering and raising said cutting element during cutting.
18. The apparatus as set forth in Claim 13, further including a guard substantially enclosing at least an upper portion of said cutting element and adapted to prevent accidental contact therewith.
19. The apparatus as set forth in Claim 13, further including:
  - a) a drive pulley enclosure substantially enclosing said drive pulley and adapted to prevent accidental contact therewith; and

- b) an outboard pulley enclosure substantially enclosing said outboard pulley and adapted to prevent accidental contact therewith.
- 20. The apparatus as set forth in Claim 13, further including inboard and outboard handles connected to said cutting head and adapted to facilitate lowering and raising said cutting head during cutting.
- 21. The apparatus as set forth in Claim 13, further including a foot structure adapted to minimize damage to the curing concrete slab during cutting, wherein said foot structure includes a channel-shaped foot having two horizontally-extending flanges which, during cutting, exert pressure against a surface of the curing concrete slab adjacent said cutting element;
- 22. The apparatus as set forth in Claim 21, wherein said foot structure retracts in order to maintain pressure on the surface of the curing concrete slab as said cutting element cuts.

23. An apparatus for cutting a transverse groove in a curing horizontal concrete slab with a single downward motion, said apparatus comprising:
- a) a cutting head including:
    - i) a cutting element, wherein said cutting element is a closed loop of steel cable strung through beads onto which has been bonded synthetic diamond material;
    - ii) a guard substantially enclosing at least an upper portion of said cutting element and adapted to prevent accidental contact therewith;
    - iii) a drive pulley and an outboard pulley about which said cutting element is entrained, wherein said drive pulley and said outboard pulley are spaced apart a sufficient distance such that said cutting element spans the curing horizontal concrete slab;
    - iv) a drive pulley enclosure substantially enclosing said drive pulley and adapted to prevent accidental contact therewith;
    - v) an outboard pulley enclosure substantially enclosing said outboard pulley and adapted to prevent accidental contact therewith;
    - vi) an inboard handle adapted to facilitate moving said apparatus into position for cutting and to facilitate lowering and raising said cutting head during cutting;

- vii) an outboard handle adapted to further facilitate moving said apparatus into position for cutting and to further facilitate lowering and raising said cutting head during cutting, and
  - viii) a foot structure adapted to minimize damage to the curing horizontal concrete slab during cutting, wherein said foot structure includes a channel-shaped foot having two horizontally-extending flanges which, during cutting, exert pressure against a surface of the curing horizontal concrete slab adjacent said cutting element, and said foot structure retracts in order to maintain pressure on the surface of the curing horizontal concrete slab as said cutting element cuts;
- b) a hydraulic drive motor adapted to drive said drive pulley and, in so doing, drive said cutting element; and
  - c) a moveable carriage adapted to movably support said cutting head over the curing horizontal concrete slab, said moveable carriage including an inboard rolling element and an outboard rolling element that allow for rolling movement of said apparatus, wherein, when said apparatus is positioned for cutting, said inboard rolling element is located adjacent a first side of the curing horizontal concrete slab and said outboard rolling element is located adjacent an opposite, second side of the curing horizontal concrete slab, such that the entirety of said apparatus straddles



the curing horizontal concrete slab, and said moveable carriage allowing for lowering and raising said cutting element during cutting.

24. A method of cutting transverse slots in a first face of a slab of concrete having a second face in contact with the ground, said method comprising the steps of:
- a) positioning a span of a continuous abrasive cable to extend entirely across the slab at a first location;
  - b) selectively rotating said continuous abrasive cable;
  - c) lowering said span of said continuous abrasive cable into contact with the first face of the slab at said first location while said continuous abrasive cable is rotating such that said span of said continuous abrasive cable rotates across said slab and cuts a first groove into the slab across the entire width of the slab at said first location in a first cutting step;
  - d) raising said span of said continuous abrasive cable out of said first groove in a raising step;
  - e) moving said continuous abrasive cable to position said span of said continuous abrasive cable to extend across the slab at a second location in a moving step;
  - f) lowering said span of continuous abrasive cable into contact with the first face of the slab at said second location while said continuous abrasive cable is rotating such that said rotating continuous abrasive cable cuts a second groove into the slab across the entire width of the slab at said second location in a second cutting step.

25. The method as in Claim 24 and further including the step of supporting the first face of the slab on opposite sides of said span of said continuous abrasive cable while said continuous abrasive cable is cutting into the slab.
26. The method as in Claim 24 wherein said continuous abrasive cable is diamond wire including a steel cable strung through a plurality of beads onto which is bonded synthetic diamond material.
27. The method as in Claim 24 wherein said raising step, said moving step and said second cutting step are repeated a selected number of times at selected intervals along the length of the concrete slab.
28. The method as in Claim 24 wherein said concrete slab comprises a roadway.